REMARKS

Claims 1 to 13 and 24 to 29 are currently pending, with claims 14 to 20, 23 and 30 to 51 having been previously withdrawn in response to a restriction requirement. Applicants thank the Examiner for allowing claims 1 to 11, 13 and 25 to 29. Reconsideration of the patentability of the pending claims is respectfully requested in view of the foregoing amendments and the following discussion.

Claim 24 has been provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1 to 34 of copending Patent Application No. 90/782,354 ("Schemmann") in view of U.S. Patent No. 5,412,351 to Nystrom et al. ("Nystrom").

Claim 24, as amended, recites that data bands are spread in frequency when modulated onto an optical carrier signal, the spreading causing an amplitude of the optical data signal to be reduced to zero during ***all*** transitional states between ***any*** pair of data symbols, in which the data symbols ***can*** change value. In this regard, the present application provides, for example, in connection with FIG. 3, that:

> FIG. 3 illustrates the key property of the QRZ format, showing that the trajectory between two successive symbols ***always*** leads through the I-Q origin. Each corner of the figure represents a pair of I, Q data symbols (e.g., I=1,Q=-1 or I=-1, Q=1). As shown, to get from adjacent corner points I=1, Q=1 (upper right corner) to I=1, Q=-1 (lower right corner) the optical data signal ***must*** travel through the origin (0,0). During each trajectory through the origin, the power of the signal, which is proportion to the square of its amplitude, goes to zero.

Specification page 8, line 28, to page 9, line 3. (Emphasis added). Thus, the subject matter of claim 24 as exemplified by FIG. 3 requires that for all transitional states between the pair of data symbols I-Q, in which data symbols I-Q can change in value, the amplitude of the data signal is reduced to zero (i.e., (0,0)).

As admitted on page 3 of the Office Action Schemmann does not disclose or suggest these features of claim 24. It is respectfully submitted that the Nystrom reference also does not disclose or suggest these features of claim 24, as asserted by the Office Action, but instead merely refers to a four point I-Q constellation that "swings through zero power point ***occasionally***". Nystrom, col. 3, lines 25 to 35 (emphasis added). That is, Nystrom refers to a QPSK modulation format that crosses though the zero power state (i.e., (0,0)) only for some transitional states but not for all transitional states, as required by claim 24. See

Nystrom Fig. 5c. Indeed, Nystrom specifically recommends using $\pi/4$ shifted QPSK modulation to ***avoid*** certain zero-power crossings to permit the use of high-efficiency nonlinear power amplifiers. See Nystrom, col. 3, lines 47 to 51.

In stark contrast, according to claim 24, zero-crossings occur between ***all*** transitional states in the I-Q constellation because it is found that forcing such zero-crossings results in beneficial properties for optical transmission, such as reduction of cross-talk at certain data transmission rates. In particular, reducing power to zero during all transitional states between ***any*** pair of data symbols, in which the data symbols ***can*** change, that is, irrespective of whether the symbols have changed value, enhances resilience to fiber nonlinearities and eliminates first order data-dependent fiber cross-talk. Indeed, such features of claim 24 are entirely different from Nystrom, in which the reduction of power to zero is dependent on the provided symbol pattern. That is, in Nystrom the power envelope depends on the data content, whereas according to claim 24, the power envelope is data independent.

It is therefore respectfully submitted that Nystrom not only does not disclose the subject matter of claim 24, but actually teaches away from it. For at least these reasons, it is respectfully submitted that the double patenting rejection of claim 24 has been overcome.

Claim 12 has been rejected under 35 U.S.C. §103(a) as unpatentable over Nystrom in view of U.S. Published Patent Application No. 2001/0050962 to Adachi et al. ("Adachi").

Claim 12 relates to a method of reducing the transmitted power of a quadrature modulated optical data signal. Claim 12, as amended, recites providing a quadrature modulated optical data signal, and during ***all*** transitional states of the quadrature modulated optical data signal in which the data symbols ***can*** change in value, reducing the power to zero such that transmitted power decreases to zero at approximately a mid point of each of the transitional states. As discussed above, Nystrom does not teach or suggest these features and moreover provides a teaching for avoiding zero crossings of output power in an I-Q constellation. The Adachi reference does not cure the deficiencies of the Nystrom reference in this regard.

Thus, it is respectfully submitted that the cited references do not render obvious the subject matter of claim 12.

Claim 24 has been rejected under 35 U.S.C. §103(a) as unpatentable over U.S. Patent No. 6,459,519 ("Sasai") in view of U.S. Patent No. 5,101,450 ("Olshansky") and further in view of Nystrom.

As discussed above, the Nystrom reference does not disclose or suggest causing an amplitude of the optical data signal to be reduced to zero during all transitional states between any pair of data symbols, in which the data symbols can change value. The Sasai and Olshansky references do not cure the deficiencies of the Nystrom reference in this regard. Accordingly, it is submitted that claim 24 is not rendered obvious by the combination of Sasai, Olshansky and Nystrom.

CONCLUSION

In light of the foregoing, Applicants respectfully submit that all pending claims 1 to 13 and 24 to 29 are in condition for allowance. Prompt reconsideration and allowance of the present application are therefore earnestly solicited.

Respectfully submitted,

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